SOME OBSERVATIONS ON THE BEHAVIOUR OF *PHILANTHUS TRIANGULUM* (F.) (HYMENOPTERA: SPHECIDAE)

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The following observations were made as part of an A-level biology course, to examine ways in which a selection of variables affects the behaviour of a chosen organism, a species of solitary wasp, *Philanthus triangulum*.

P. triangulum is indigenous to hot heathland slopes and sandy banks. It is found mainly in central Europe and was, until recently, considered to be a rare species in Britain (Falk, 1991), although its numbers have increased dramatically in the past 10 years and it is now recorded from around one hundred 10-km squares. Its activity can be observed from mid to late summer. This wasp appears to prey only on the common honeybee, *Apis mellifera* L., and is sometimes known by the common name of bee wolf.

A local entomologist reported seeing a colony on Ambersham Common, near Midhurst, West Sussex. There was no guarantee that they would be present and, as I had only seen evidence of a nest hole once before, I was not entirely sure that I would be able to find the colony. All I had to go on was a map reference.

The land there was a very loose sandy soil containing a great deal of flint deposits. The surrounding area is open, dry heathland with bracken and heather. The woods that surround the area contain a mixture of pine, birch and a small number of oak saplings.

The heath is criss-crossed with bridle-paths and access routes for electricity pylons. It was along one such bridle-path that I found a long south-facing sandy slope which is typical of that used by *P. triangulum*.

Nest tunnels were clearly visible because of the huge fans of excavated material dug out by the wasps. These lay directly below each nest entrance. The nest holes had large D-shaped openings. Around most entrances lay the remains of honeybees. I noted that there were two holes to each nest, the second one being to the right of the D-shaped one. This smaller hole was the one most used by the wasp and, in some cases, the only hole being used.

I studied the wasps on two consecutive days, on 9 and 10.viii.1995, which were the two hottest days and likely to bring results as both bees and wasps would be active. Each day I made close observation of the site, temperature, weather conditions and detailed behaviour of the wasps for 7 hours. I took temperature readings and made notes on the wasps' movements.

I started my observations at 8 a.m. each day. Small flies and other insects were already active, but I had to wait until 10.30 a.m. before *P. triangulum* first emerged. The number of wasps flying in and out of nests increased with the temperature and reached its maximum level at 2 p.m. when the temperature was around 32°C. At higher temperatures the activity of flying wasps declined dramatically to only a few departures and arrivals per hour.

The first behavioural pattern of *P. triangulum* that I observed was when it first appeared at the nest entrance. The wasp did not exit for about 20 to 30 seconds, but would sit half emerged from the nest entrance and appear to warm itself. Excavation of the burrow then took place as the wasp cleared out material from inside the entrance with its hind legs. The debris was cast below the hole in a large fan-shaped heap of spoil. Excavation took the wasp 2 or 3 minutes to complete.

The wasp then sealed up the nest entrance with some of the discarded material, by walking backwards to shovel sand over the hole in use. It seems likely that the entrance was concealed as a precaution against intrusion from predatory wasps or other insects. This was noted by another researcher who was studying the behaviour of *P. triangulum* on the same days. I could always tell when a wasp was out hunting because the hole was concealed so that only a slight depression was visible. When the wasp was inside its burrow, the hole was left open.

After the nest was sealed, the wasp began to fly in a slow circling motion around the nest site, as if to acquaint itself with the immediate nest area before flying off in search of prey. Often, before a long flight, the wasp would feed on heather, taking nectar to provide it with enough energy for its journey across the heathland.

I observed that when the sun was at less than 195° from magnetic north (before 2 p.m.) the wasps flew to and from the south. When the sun was at a greater angle, the wasp flew out to the north. Because the nesting bank faced almost due south, when a wasp flew out from its nest it would always keep the sun to its left side if it flew south in the morning and north in the afternoon. I believe it may do this for navigational purposes as well as using its polar orientation. This may help prevent over-exploitation of a particular hunting area, so the wasp would be able to feed in new parts of the heathland without exhausting others. However, this flight behaviour may also be brought about by the fact that bees might be feeding in different areas of the heathland if nectar flow in the flowers ceased by mid-day because of the heat and lack of moisture.

I next recorded details of the hunting behaviour of *P. triangulum*. A bee would sit on a sprig of heather, collecting its nectar and pollen. *P. triangulum* would approach from down-wind, as if to pin-point the scent. When totally sure of its prey's position, the wasp would pounce on the bee and appeared to sting under the bee's head to immobilize it. The bee was then slung beneath the wasp. This slowed the wasp's flight considerably and made it much easier to spot.

On returning to its nest site with prey, the wasp would undergo a sweeping flight similar to when it left, but this time it swept down to the nest area. It would find the burrow, dig through the sealed entrance and drag its prey into the hole.

On the second day I decided to see how the wasp would react upon returning to its nest to find a change in the local landscape. I placed a fist-sized rock just to the right of the sealed hole while the wasp was away. When it returned the wasp approached the area as expected, but appeared confused and disturbed at the change in surroundings since its departure. It began a frantic flight around the area. This continued for about 45 seconds but then the wasp flew high over the nest site and began a second, more detailed, descent and this time was able to find its nest hole. Without this change to its surroundings the wasp would usually take around 10 seconds to complete this task. When it left again, it took a good reconnaissance flight over most of the area as if to ensure that it could record every landmark.

My conclusions from this study are that the wasps not only have a large hole to the nest, but also have a smaller one in constant use to the side of it. They prey entirely on honeybees. They use the angle of the sun from magnetic north for navigational purposes. On leaving the nest they seal the hole as a precaution against intruders and take careful note of the surrounding area so that they can find the nest hole again. Wasp activity increases with a rise in temperature, but has its greatest level at around 32°C.

Reference

Falk, S. 1991 *A review of the scarce and threatened bees, wasps and ants of Great Britain*. Research and Survey in Nature Conservation No. 35. Nature Conservancy Council, Peterborough. pp. 138–139.